Catalogue of American Amphibians and Reptiles.

Dundee, H.A. 1998. *Necturus punctatus*.

Necturus punctatus (Gibbes)
Dwarf Waterdog

Necturus ___: Baird 1850:251. Indicated *Necturus* ___ Gibbes, not yet published.

Menobranchus punctatus Gibbes 1850:159. Type locality, "South Santee River, a few miles from its mouth." Holotype, presumably National Museum of Natural History (USNM) 11813 (not seen by author). The first actual specimen was collected in February 1848, by one of Mr. Augustus Shoolbred's negro workers on Shoolbred's plantation but was lost. A few weeks later, additional specimens were presented to Gibbes by Dr. A. Gadsden, and again, shortly thereafter, additional specimens were given to Gibbes by Mr. Shoolbred. All apparently came from Shoolbred's plantation in 1848. Two others, given to Gibbes by Shoolbred in March 1850, apparently came from his father's (Dr. Shoolbred) plantation; all were exhibited in Charleston, South Carolina in March 1850 (see Comment). Cope (1889) stated that USNM 11813 was the type; it was received from Gibbes and, according to Cope (1889), was collected in 1850. Cope's mention of cloacal papillae in USNM 11813 would indicate that the specimen was a male. The specimen had a SVL of 120 mm and TL of 171 mm. Dunn (1918) mentioned Museum of Comparative Zoölogy, Harvard College (MCZ) 1553 as a cotype.

Necturus punctatus: Cope 1866 (1867):102. First use of present combination; also placed *Necturus* in order Proteïda.

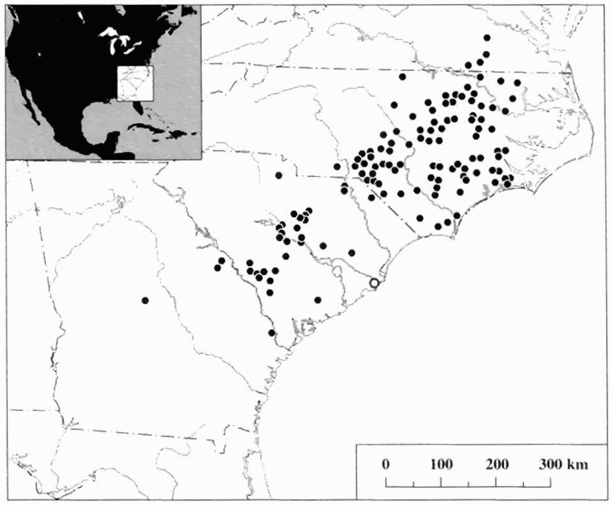
Necturus punctatus lodingi: Chermock 1952:23. No basis for nomenclature; apparently an opinion based on Visoca's (1937) use of name *Necturus lodingi*.

Necturus punctatus punctatus: Hecht 1958:13.

• **CONTENT.** No subspecies are currently recognized.

• **DEFINITION.** *Necturus punctatus* is a perennibranch salamander and the smallest species of the genus, maximum TL being 189 mm. The tail length ranges from about 36–41% (average 38%) of the TL in adults, with sexual maturity being reached at approximately 65–70 mm SVL (about 4.5 or more years of age). Toes are 4-4 and costal grooves number 14–16. The head and snout are depressed and the caudal fin is high and strongly compressed. The 2N chromosome number is 38 including two heteromorphic chromosomes.

The dorsal ground color in the vast majority of specimens appears to be dark brown or perhaps dark olive (but rarely some yellow pigment may be present). Many fine white punctations are most noticeable in preserved specimens, probably due to the white mucus that has seeped from the skin glands. This plain colored dorsum distinguishes *N. punctatus* from all other *Necturus* but some specimens, especially in the Cape Fear and Lumber river systems of North Carolina, are distinctly spotted, thus causing them to be confused with *Necturus lewisi* with



MAP. Range of *Necturus punctatus*. The circle marks the type locality and dots represent most known localities.

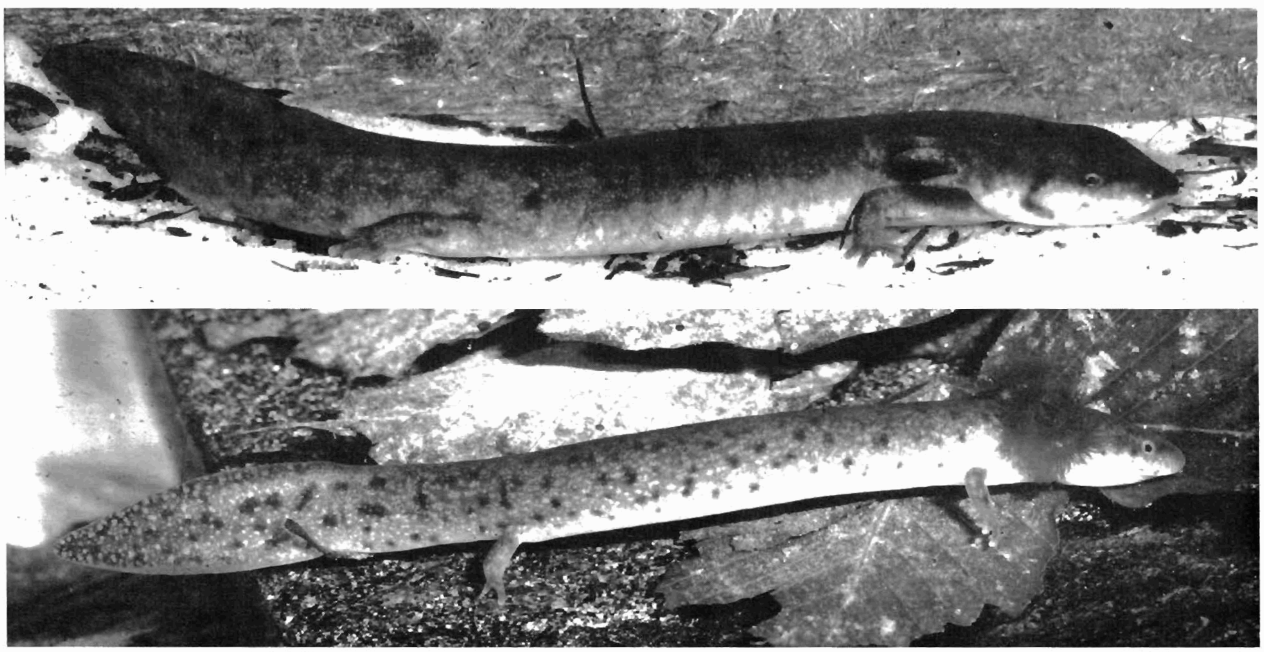


FIGURE. Photographs of living *Necturus punctatus*: unspotted phase from Aiken Co., South Carolina (top) and spotted phase from Moore Co., North Carolina (bottom). Photographs courtesy of R. Wayne Van Devender.

which it may occur sympatrically (see Diagnosis). The pattern variation is due to a single allelic difference (Ashton et al. 1985). The venter usually is a dirty white, but a few small dark puntations may encroach slightly onto the lateral sides of the venter (see discussion under Illustrations). In the northeastern section of North Carolina, in the Chowan and Roanoke river drainages, the venter may be dark (Alvin L. Braswell, pers. comm.).

• **DIAGNOSIS.** The 4-4 toe count distinguishes *Necturus* from all other salamanders found in the United States except *Hemidactylium scutatum* and *Eurcyea quadridigitata,* plethodontids that normally transform into terrestrial adults. Larvae of the latter two species have the dorsal tail fin extending onto the body. *Hemidactylium* is further distinguished by having only 12 costal grooves and larvae of *E. quadridigitata* have a striped pattern.

Necturus punctatus is the only *Necturus* that has a plain colored dorsum. In the Neuse and Tar river drainages of North Carolina, *N. punctatus* may be sympatric with *N. lewisi* in the main channels and mid-sized tributaries. The more rounded and slender body of *N. punctatus* differs from the flattened and stouter body of *N. lewisi*. The dorsal spots that may occur on some specimens of *N. punctatus* are less distinct than those of *N. lewisi*, and Neuse and Tar river *N. punctatus* are not spotted. *Necturus punctatus* has an immaculate venter, whereas that of *N. lewisi* is spotted. The latter species also tends to have a more yellowish brown dorsum.

• **DESCRIPTIONS.** Subsequent to the original (Gibbes 1850), Gibbes (1853) provided a more detailed description that contained drawings of dorsal and ventral views of a specimen. If this was the type, then it matched the description given by Cope (1889), but apparently did not represent the drawing that Gibbes (1850) mentioned. The latter mentioned ill-defined dark spots that did not appear in the Cope drawing. Also, the text of Gibbes (1853) mentioned larger, ill-defined spots. In this publication, he stated that Mr. Shoolbred's first specimen came from his father's (Dr. Shoolbred) plantation.

Additional descriptions with various degrees of detail appeared in Alford (1923), Anon. (1985), Baird (1850), Behler and King (1979), Bishop (1943), Blair (1968), Brimley (1924, 1939), Cochran and Goin (1970), Conant (1958, 1975), Conant and Collins (1991, 1998), Cope (1889), Fedak (1971), Folkerts (1971), Gibbes (1853), Hecht (1953, 1958), Martof (1956), Martof et al. (1980), and Viosca (1937). For less extensive descriptions, see Pertinent Literature.

• **ILLUSTRATIONS.** Gibbes (1853) provided line drawings of the dorsum and venter of an adult. Cope (1889) included line drawings of head, feet, and interior of the mouth. Bishop (1943) showed black-and-white views of the dorsum and lateral views of larvae. Hecht (1953) illustrated sexual differences, and included black-and-white photographs of adults and larvae and drawings of dorsal and ventral patterns. A line drawing of the dorsal and ventral midbody pattern appears in Hecht (1958). Conant (1958) contained a line drawing of the venter, and Conant (1975) included both the same line drawing of the venter and a black-and-white photograph of a lateral view. Conant and Collins (1991, 1998) contained the same line drawing as Conant (1958, 1975), but the photograph was colored. Powell et al. (1998) also provided a line drawing of the venter. The line drawings in Conant (1958, 1975), Conant and Collins (1991, 1998), and Powell et al. (1998) showed far more extensive dark punctations on the venter than is normal.

Brode (1969) included black-and-white photographs. Fedak (1971) presented black-and-white photographs of adults and larvae. Mitchell (1977) included a color drawing in lateral view. Behler and King (1979) provided color photographs. Martof et al. (1980) contained a color photograph. Gibbons and Semilitsch (1991) included a drawing of a larva.

Sessions and Wiley (1985) contained black and white photographs of mitotic figures, an idiogram of the karyotype, and a line drawing of the Y chromosome.

• **DISTRIBUTION.** *Necturus punctatus* primarily inhabits the Coastal Plain from southeastern Virginia to south central Georgia, but also enters the Fall Line and Piedmont from North Carolina to Georgia. It is most common in smaller streams and rivers, but also occurs in swamps and pools. In North Carolina, it is sympatric with *N. lewisi* in the Neuse and Tar river systems, but there it tends to occupy the smaller streams. Typically the preferred habitat is in stained and darker waters, and especially where aquatic plants and leaf beds are prevalent. Brode (1969) regarded *Necturus* from streams around Mobile as *Necturus punctatus lodingi*. Frost (1985) stated that the species ranged westward to Mobile; apparently he considered *punctatus* to include the form that had been called *N. p. lodingi.* Admittedly, those *Necturus* populations have plain colored venters, but they are definitely spotted above, and in the confused state of *Necturus* systematics, appear to be related to *Necturus beyeri* or possibly an undescribed species (Henry Bart, Jr., pers. comm.).

Two small hiatuses appear in the distribution: the lower parts of the Pee Dee River in South Carolina and in streams of the southeast corner of South Carolina. Whether these are real or due to a lack of collecting is unknown.

• **FOSSIL RECORD.** None.

• **PERTINENT LITERATURE.** Published references to the species are listed by topic: **abnormalities** (Alford 1923), **anatomy** (Brandon 1969; Brode 1969; Francis 1934, but only as *Necturus*; Gibbes 1853; Reed 1920, only as *Necturus*; Sever 1991, 1992, 1994), **associates** (Braswell and Ashton 1985, Brimley 1939, Fedak 1971, Folkerts 1971, Neill 1941), **bibliography** (DePoe et al. 1961), **bionumeric code** (Brame et al. 1981), **blood** (Gibbes 1853), **checklists** (DePoe et al. 1961; Frost 1985; Harding 1983; Martof 1956; Neill 1949; Schmidt 1953; Stejneger & Barbour 1917, 1923, 1933, 1939, 1943; Werner 1908), **cladistics** (Guttman et al. 1990), **chromosomes** (Schmid et al. 1991, Sessions and Wiley 1985), **collecting methods** (Braswell and Ashton 1985, Brode 1969, Fedak 1971, Freeman 1955, Gibbons and Semilitsch 1991), **color and pattern** (Ashton et al. 1980, Brode 1969), **comparison with other species** (Brimley 1924, Fedak 1971, Folkerts 1971, Gunter and Brode 1964, Noble 1931), **common names** (Collins 1990, 1997; Collins et al. 1978, 1982; Harris 1954), **conservation** (Mitchell 1977,1988, 1989, 1991a, b; Pague and Mitchell 1987; Tobey 1979, 1985), **cytology** (Kezer et al. 1965), **descriptions** (Alford 1923; Anon. 1985; Baird 1850; Behler and King 1979; Bishop 1943; Blair 1968; Brimley 1924, 1939; Cochran and Goin 1970; Conant 1958, 1975; Conant and Collins 1991, 1998; Cope 1889; Fedak 1971; Folkerts 1971), **diagnostic characters** (Conant 1958, 1975; Conant and Collins 1991, 1998; Viosca 1937), **distribution** (Brode and King 1985; Bishop 1943; Braswell and Ashton 1985; Brimley 1918, 1924, 1926, 1939; Brimley and Sherman 1908; Brode 1969; Cochran and Goin 1970; Cope 1875, 1889; Dunn 1918; Eaton 1953; Fedak 1971; Freeman 1955; Gibbons and Patterson 1978; Gibbons and Semilitsch 1991; Grove 1931; Gunter and Brode 1964; Harrison 1978; Martof 1956; Mitchell 1977, 1997; Myers 1957; Neill 1954; Noble 1931; Pague and Mitchell 1987; Pickens 1927; Sever 1991,1992; Tobey 1985; Vitt and Laerm 1982; Werner 1908; Williamson and Moulis 1979, 1994; Wright 1926; Yarrow 1882 [1883]), **distri-**

bution maps (Behler and King 1979; Brode 1969; Conant 1958, 1975; Conant and Collins 1991, 1998; Hecht 1953, 1958; Tobey 1985), **ecology** (Braswell and Ashton 1985, Nevo and Beiles 1991), **eggs** (Folkerts 1971, Meffe and Sheldon 1987), **electrophoretic studies** (Ashton et al. 1980, Kaltenbach 1982, Maxson et al. 1988), **endangered status** (Anon. 1975, Ashton 1976, Gibbons et al. 1976, Russ 1973, Tobey 1979, Virginia Natural Heritage Program *fide* Pague and Mitchell 1987), **endocrine glands** (Lynn and Wachowski 1951), **enemies** (Ashton 1985), **evolution** (Hecht 1953, 1957; Kezer et al. 1965; Maxson et al. 1988), **food habits** (Braswell and Ashton 1985, Brode 1969, Fedak 1971, Folkerts 1971, Gibbons and Semilitsch 1991, Meffe and Sheldon 1987), **genetics** (Ashton et al. 1980, Nevo and Beiles 1991, Sessions and Wiley 1985, Shaffer and Breden 1989), **growth** (Brode 1969, Fedak 1971), **habitat** (Ashton 1985, Behler and King 1985, Bishop 1943, Blair 1968, Cochran and Goin 1970, Brandon 1969, Eaton 1953, Fedak 1971, Folkerts 1971, Funderburg 1955, Gibbes 1850, Harris 1959, Harrison 1978), **habits** (Braswell and Ashton 1985, Fedak 1971, Harris 1959, Neill 1963), **keys** (Altig and Ireland 1984; Blair 1968; Brimley 1907; Brimley 1926; Chermock 1952; Gibbons and Patterson 1978; Gibbons and Semilitsch 1991; Hecht 1953, 1958; Ireland 1981; Martof 1956; Powell et al. 1998; Valentine 1964; Viosca 1937), **larvae** (Bishop 1943, Brandon 1969, Brimley 1924, Folkerts 1971), **life history** (Shaffer and Breden 1989), **life span** (Bowler 1977, Snider and Bowler 1992, Fedak 1971, Folkerts 1971), **measurements of type** (Cope 1889), **morphometrics** (Hecht 1953, Fedak 1971), **movements and home range** (Ashton 1985), **neoteny** (DeBeer 1958), **nomenclatural history** (Hecht 1953), **paedomorphosis and paedogenesis** (DeBeer 1958), **phylogeny** (Guttman et al. 1990; Larson 1991; Maxson et al. 1988; Sever 1991, 1992, 1994), **relationships** (Hecht 1953, Maxson et al. 1988), **reproduction** (Cochran and Goin 1970, Harris 1961, Mitchell 1977, Sever 1994), **seasonal availability** (Fedak 1971), **sexual differences** (Brode 1969, Hecht 1953, Meffe and Sheldon 1987), **sexual maturity** (Fedak 1971), **sex ratios** (Fedak 1971), **specific localities** (Alford 1923; Anon. 1985; Bishop 1927; Brimley 1907, 1915, 1924; Brimley and Mabee 1925; Brown 1992; Brode 1969; Corrington 1929; Fedak 1971; Fowler and Dunn 1917; Funderburg 1955; Hoy et al. 1953; Kaltenbach 1982; Myers 1924; Neill 1941; Penny 1952; Pickens 1927; Seyle 1985), **sympatry** (Ashton 1985, Fedak 1971), **synonymies** (Barbour and Loveridge 1929, Brode 1969), **systematics** (Bart et al. 1997, Brode 1969, Hecht 1958, Viosca 1937), **taxonomy** (Brandon 1969, Ashton et al. 1980, Brimley 1924, Brode 1969), **teeth** (Fedak 1971, Hecht 1953, Oltmans 1952), **variation** (Fedak 1971, Guttman et al. 1990), **weight versus length** (Fedak 1971), **zoogeography** (Brimley and Sherman 1908, Brode 1969).

• **ETYMOLOGY.** The generic name, *Necturus,* is derived from the Greek *necktris*, a swimmer, obviously because the group is aquatic, and the specific epithet, *punctatus*, is from the Latin meaning spotted, obviously a reference to the many small punctations in the dorsal pattern.

• **REMARKS.** Julian Harrison provided some interesting notes from the Charleston Museum files relative to the type locality. Comments penned by E. Burnham Chamberlain: "our collection contains four (4) old specimens labeled: '*Menobranchus punctatus* - Santee rice fields. S.C. Prof. L.R. Gibbes. Elliott Society' [Charleston's counterpart to the Academy of Natural Sciences] Are these type specimens?" Also, "Minutes Elliott Society Jan. 1, 1854 show receipt of specimens (fluid and skeletons) from L.R. Gibbes. Our Gibbes specimens are marked Elliott Society." Also in pencil, no signature: "Between Harrietta and Wedge. Jan. 15, 1854." The latter were (and still are) former rice plantations on South Santee River, "...a few miles from its mouth." Harrison suggested that some or all of the original specimens, including possibly the type, came from ricefields between these two plantations.

Because the first use of the names *Necturus punctatus punctatus* and *N. p. lodingi* occurred in an unpublished dissertation by Hecht (1953), the names have no validity.

Loding's (1922) listing of *Necturus punctatus* was of a misidentified specimen.

• **COMMENT.** Major checklists by Stejneger and Barbour (1917, 1923, 1933, 1939, 1943), Schmidt (1953), Harding (1983), and Frost (1985) stated the type locality in part as Dr. Schoolbred's plantation, but Gibbes clearly gave the name as Mr. Shoolbred. A search of a telephone directory for the United States showed not a single listing for a Schoolbred, but a modest number of Shoolbreds are listed in South Carolina (including one in Charleston, which is very near the type locality; the current Charleston directory listed no Shoolbreds), one in Savannah, Georgia, and three in California. From this I deduce that Gibbes very likely had the correct name.

In peripheral parts of the range, Virginia and Georgia, the species is considered endangered. This interpretation may reflect inadequate collecting effort.

• **ACKNOWLEDGMENTS.** Complete distributional records for North Carolina were provided by Alvin L. Braswell, and most localities for South Carolina were provided by Al Sanders and Julian Harrison of the Charleston Museum.

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